

REMARKS

This amendment is submitted in response to the Office Action mailed on July 14, 2005 in which claims 1-19 were rejected. With this Amendment, claims 8 and 14 are amended, and claim 20 is added. Accordingly, claims 1-20 are presented for reconsideration and allowance.

I. Response to Specification Objections

In the Office Action, the specification was objected to because the status of the parent application was not updated with the issued patent number. As requested, the specification is amended to update the status of the parent application.

Additionally, the paragraphs on page 9, lines 8-19; page 10, lines 4-12; and page 12, lines 4-12 are amended to correct a typographical error. In particular, "inlet 63" is amended to "inlet 61", to avoid labeling different parts with the same reference label. A replacement page for FIG. 2 is also enclosed with the corrected label.

II. Response to Obviousness Rejections of Claims 1-7

Claims 1, 2, 5, and 6 were rejected under 35 U.S.C. § 103(a) as being obvious over Crump, U.S. Patent No. 5,340,433 ("the Crump '433 patent"); claim 3 was rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent in view of Scholz, U.S. Patent No. 5,120,476 ("the Scholz '476 patent"); claim 4 was rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent in view of Gore, U.S. Patent No. 5,257,657 ("the Gore '657 patent"); and claim 7 was rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent in view of Reiss, U.S. Patent No. 5,581,994 ("the Reiss '994 patent") and Beeston, U.S. Patent No. 3,472,452 ("the Beeston '452 patent").

With respect to independent claim 1, the Examiner stated:

Crump appears to be silent to maintaining physical and thermal separation between the heated build chamber and the gantry that controls motion of the dispensing head. However, these aspects would have been *prima facie* obvious because Crump teaches

carriage rods for providing translational movement by a servo motor (12:45-63) and that the dispensing head remains inside a controlled environment (15:21-27). It would have been *prima facie* obvious to also isolate the gantry (Items 288 in Fig. 13 and Items 245, 288, and 280 in FIG. 17) from the heated build chamber in order to avoid transferring heat from the chamber to the dispensing head in the controlled environment chamber (Fig. 13, Item 202).

(Office Action, page 3). However, in addition to retaining the dispensing head inside the controlled environment, the Crump '433 patent also discloses that the mechanisms for controlling motion of the dispensing head 200 and the base member 10 (e.g., carriage 245, and carriage rods 288 and 290) are also retained within the controlled environment.

The successful forming of three-dimensional prototypes or models by the apparatus and process described herein is enhanced and controlled by *placing the entire dispensing head 200, within its cover 202 inside a controlled environment, together with base member 10 and X,Y-Z translation table and guide rod assembly for the dispensing head 200 and the base member 10*. The controlled environment is established inside a transparent cabinet *housing the aforesaid components*.

(the Crump '433 patent, col. 15, lines 21-27) (emphasis added). This is further shown by the illustration in FIG. 13 of the Crump '433 patent. As shown, carriage rods 288 are disposed below the majority of the dispensing head 200 to support the weight of dispensing head 200. As a result, carriage rods 288 are required to be physically located within the controlled environment for supporting the dispensing head 200. Positioning carriage rods 288 outside of the controlled environment would correspondingly place the dispensing head 200 outside of the controlled environment as well. This would effectively prevent the use of the dispensing head 200.

Additionally, the preferred temperature inside the operating cabinet is preferably kept within a range of 40°C to 60°C. (the Crump '433 patent, col. 15, lines 35-36). Such temperatures effectively eliminate the need to maintain a physical and thermal separation

between the controlled environment and mechanisms for controlling motion of the dispensing head 200 and the base member 10. As such, the Crump '433 patent does not disclose or suggest maintaining physical and thermal separation between the heated build chamber and the gantry, or any benefits obtained from such an arrangement. Accordingly, claim 1 is not obvious over the Crump '433 patent, taken alone.

Furthermore, the Scholz '476 patent does not disclose or suggest the use of a heated build chamber, or maintaining a physical and thermal separation between a heated build chamber and a gantry, as required by claim 1. Rather, the Scholz '476 patent is directed toward a stereolithography system that incorporates a vertically adjustable surface disposed within a vessel of photopolymerizable liquid. As a result, claim 1 is also not obvious over the Crump '433 patent in view of the Scholz '476 patent.

Additionally, the Gore '657 patent does not disclose or suggest maintaining a physical and thermal separation between a heated build chamber and a gantry, as required by claim 1. In fact, the Gore '657 patent discloses maintaining a build chamber (i.e., enclosure 22) at ambient temperatures.

Because most molten metals when exposed to air become coated with an oxide layer that typically interferes with bonding, the controllable environment within enclosure 22 shown in FIG. 1 preferably contains an inert gas atmosphere or vacuum. *Persons skilled in the art will note that the controllable environment may be nothing more than a generic room having an ambient air temperature and composition.*

(the 'Gore '657 patent, col. 6, lines 55-62) (emphasis added).

Droplets 138 were directed towards a target surface 160 on a 3 mm thick aluminum sheet 162 surrounded by an argon atmosphere *at room temperature.*

(the Gore '657 patent, col. 7, lines 8-10) (emphasis added). The ambient temperatures effectively eliminate the need to maintain a physical and thermal separation between enclosure 22 and a mechanism that controls motion of ejection head 20. Thus, claim 1 is also not obvious

over the Crump '433 patent in view of the Gore '657 patent.

The Reiss '994 patent and the Beeston '452 patent also do not disclose or suggest maintaining a physical and thermal separation between a heated build chamber and a gantry, as required by claim 1. Moreover, the Reiss '994 patent and the Beeston '452 patent do not even disclose or suggest the use of a dispensing head, or a gantry that controls motion of a dispensing head. As such, claim 1 is also not obvious over the Crump '433 patent in view of the Reiss '994 patent and the Beeston '452 patent.

Because independent claim 1 is not obvious over Crump '433 patent, taken alone or in combination with the Scholz '476 patent, the Gore '657 patent, the Reiss '994 patent, or the Beeston '452 patent, claims 2-7, which depend from claim 1, are also not obvious over these references, taken alone or in combination.

III. Response to Obviousness Rejections of Claims 8-13

Claims 8, 11, and 12 were rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent; claims 9 and 10 were rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent in view of the Gore '657 patent; and claim 13 was rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent in view of the Reiss '994 patent and the Beeston '452 patent.

With respect to independent claim 8, the Examiner stated that "Crump teaches motion control components (Items 36 and 38 in Fig. 1), which would have obviously been thermally and externally located to the build chamber". Items 36 and 38 in Fig. 1 of the Crump '433 patent refer to computer 36 and keyboard 38. Hence, it is believed that the Examiner has taken the position that the term "motion control components" encompasses computer 36 and keyboard 38.

As amended, claim 8 requires that the motion control components are located external to the build chamber and that thermal isolation is maintained between the external motion control components and the build chamber, where the motion control components comprise at least one rail that defines an axis of movement for the dispensing head. As disclosed

in the current application, the method of the present invention protects motion control components of gantry 18 (e.g., x-rails 68 and y-rails 70) from elevated temperatures within build chamber 24 by locating the motion control components external to build chamber 24 and by maintaining thermal isolation between the external motion control components and build chamber 24.

In contrast, as discussed above for claim 1, the Crump '433 patent discloses that the mechanisms for controlling motion of dispensing head 200 and base member 10 (e.g., carriage 245, and carriage rods 288 and 290) remain within the controlled environment. As such, the Crump '433 patent does not disclose or suggest that the motion control components, which comprise at least one rail that defines an axis of movement for the dispensing head, are located external to the build chamber, or that thermal isolation is maintained between the external motion control components and the build chamber. Accordingly, claim 8 is not obvious over the Crump '433 patent, taken alone.

Additionally, the Gore '657 patent, the Reiss '994 patent, and the Beeston '452 patent do not disclose or suggest that the motion control components, which comprise at least one rail that defines an axis of movement for a dispensing head, are located external to the build chamber, or that thermal isolation is maintained between the external motion control components and the build chamber, as required by claim 8. Therefore, claim 8 is also not obvious over the Crump '433 patent in view of the Gore '657 patent, the Reiss '994 patent, or the Beeston '452 patent. Because independent claim 8 is not obvious over Crump '433 patent, taken alone or in combination with the Gore '657 patent, the Reiss '994 patent, or the Beeston '452 patent, claims 9-13, which depend from claim 8, are also not obvious over these references, taken alone or in combination.

IV. Response to Obviousness Rejections of Claims 14-20

Claims 14, 17, and 18 were rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent; claims 15 and 16 were rejected under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent in view of the Gore '657 patent; and claim 19 was rejected

under 35 U.S.C. § 103(a) as being obvious over the Crump '433 patent in view of Caugherty, U.S. Patent No. 2,117,651 ("the Caugherty '651 patent").

With respect to independent claim 14, the Examiner stated that "Crump teaches the motion of the dispensing head and base being controlled by motion control components, which would have obviously been located external and in thermal isolation from the build chamber (Fig. 1, Items 36 and 38)." As amended, claim 14 requires that the motion control components are located external to and in thermal isolation from the build chamber by at least one deformable thermal insulator. The Crump '433 patent does not disclose or suggest the use of a deformable thermal insulator to cause the motion control components to be located external to and in thermal isolation from the build chamber. Accordingly, claim 14 is not obvious over the Crump '433 patent.

Moreover, the Gore '657 patent and the Caugherty '651 patent also do not disclose or suggest the use of a deformable thermal insulator. As a result, claim 14 is also not obvious over the Crump '433 patent in view of the Gore '657 patent, or in view of the Caugherty '651 patent. Because independent claim 14 is not obvious over Crump '433 patent, taken alone or in combination with the Gore '657 patent or the Caugherty '651 patent, claims 15-20, which depend from claim 14, are also not obvious over these references, taken alone or in combination.

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CONCLUSION

Because the prior art made of record does not show, suggest, or teach all the limitations in claims 1-20, pending claims 1-20 are in condition for allowance. Favorable reconsideration and allowance of this application are respectfully requested.

Respectfully submitted,

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